

PATENT ABSTRACTS OF JAPAN

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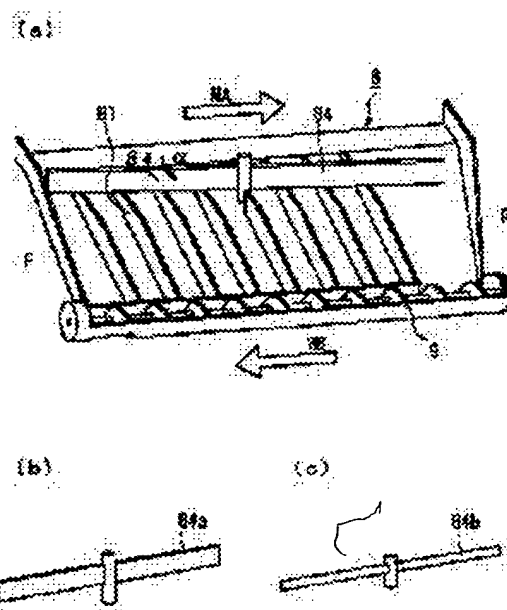
(54) DEVELOPING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a developing device which autonomously adjusts the conveyance amount of a developer irrelevantly to the deviation direction of the developer and holds the balance of the amount of the developer constant.

SOLUTION: A balance 84 which can slant corresponding to the deviation of the amount of the developer is provided before the place where the developer flows in a fin 81. While the developer deviates to a side F, the amount of the developer scooped up onto a separator 8 also deviates to the side F, so a force pressing the balancer 84 deviates and the balancer slants toward α .

Consequently, the amount of the developer flowing on the separator 8 is large on the side F and small on a side R, so the amount MA of the developer carried to the side R by the fin 81 is larger than the amount MB of the developer carried to the side F by a conveyor screw 9, so that the developer having deviated to the side F is returned to the side R.



LEGAL STATUS

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[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1] The developer support which develops the latent image which conveyed the developer and was formed on latent-image support, The developer feed zone material which agitates the development container which holds the developer for supplying this developer support, and the toner and developer which are supplied, and supplies the developer in this development container to developer support, The developer specification-part material which sets the developer on this developer support as the thickness suitable for development, The member for developer flowing down which makes it flow down the developer scratched by this developer specification-part material to the part distant from this developer support, The member for skews for being in the middle of flowing down, and carrying out the skew of the developer to the direction which intersects perpendicularly with the shaft orientations of this developer support, In the developer equipped with the developer conveyance member which conveys this developer in this developer support revolving-shaft direction in response to a part of developer on this member for developer flowing down The developer characterized by having the member which adjusts the amount in which a developer flows into this member for skews according to the bias of the amount of a developer before a developer flows into this member for skews.

[Claim 2] The developer characterized by the above-mentioned members for skews being the shaft of the above-mentioned developer support, and a tabular member to which it has a revolving shaft perpendicularly in a developer according to claim 1.

[Claim 3] The developer characterized by the above-mentioned member for skews being a rod [which has a revolving shaft in the shaft and perpendicular direction of the above-mentioned developer support]-like member in a developer according to claim 1.

[Claim 4] The developer support which develops the latent image which conveyed the developer and was formed on latent-image support, The developer feed zone material which agitates the development container which holds the developer for supplying this developer support, and the toner and developer which are supplied, and supplies the developer in this development container to developer support, The developer specification-part material which sets the developer on developer support as the thickness suitable for development, The member for developer flowing down which makes it flow down the developer scratched by this developer specification-part material to the part distant from this developer support, The member for skews for being in the middle of flowing down, and carrying out the skew of the developer to the direction which intersects perpendicularly with the shaft orientations of this developer support, In the developer equipped with the developer conveyance member which conveys this developer in this developer support revolving-shaft direction in response to a part of developer on this member for developer flowing down The developer characterized by having the member which adjusts the amount of the developer down which the developer which flowed into this member for skews flows according to the bias of the amount of a developer before flowing down from this member for developer flowing down.

[Claim 5] The developer characterized by said members for skews being the shaft of said developer support, and a tabular member to which it has a revolving shaft perpendicularly in a developer according to claim 4.

[Claim 6] The developer characterized by said member for skews being a rod [which has a revolving shaft in the shaft and perpendicular direction of said developer support]-like member in a developer according to claim 4.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the developer carried in image formation equipments, such as a copying machine which used the electrophotography method, facsimile, a printer, and a direct digital platemaking machine, and relates to amelioration of the agitator style to the developer support shaft orientations of a developer in detail.

[0002]

[Description of the Prior Art] In the developer using the developer of the two-component system which consists of a conventional carrier and a conventional toner, consumption of a toner is performed according to the latent image on latent-image support out of the developer conveyed on developer support. Since potential distribution of the latent image over the shaft orientations of developer support is usually uneven, the toner consumption from the developer on developer support also becomes uneven, and a difference produces it in developer support shaft orientations in the developer on the developer support after development at toner concentration.

[0003] So, in the conventional developer, in order to supply the developer of uniform toner concentration to developer support shaft orientations, shaft orientations [say / the so-called horizontal stirring] are stirred. More than one are arranged on the separator as a member for developer flowing down down which it is made to flow as a device of horizontal stirring of a developer in response to the developer scratched from developer support with the doctor blade as developer specification-part material. The fin as a member for skews to which the skew of the developer which flows this separator top is carried out to the direction which intersects perpendicularly with developer support shaft orientations, In response to a part of developer on this separator, with the direction conveyed with this fin, what has prepared the conveyance screw as a developer conveyance member conveyed to hard flow is used, and horizontal stirring of a developer is performed by this fin and the conveyance screw.

[0004] Moreover, what performs horizontal stirring as forms two or more steps of separators and differs the include angle which carries out a skew with a fin is proposed like the developer of the disclosure to JP,61-156075,A. However, in the developer which performs horizontal stirring with the above structures, if the horizontal of a developer shifts or the fluidity of a developer is changed by toner concentration, environmental change, etc., a developer will produce a bias in development support shaft orientations. The bias of such a developer will produce nonconformities, such as a gap of toner concentration control, and scattering of a toner, drop of a developer.

[0005] On the other hand, in the developer currently indicated by the patent No. 02827438 official report, when it arranges so that some include angles of a fin may be differed on a separator, and a part of developer makes hard flow carry out a skew to developer support shaft orientations, the bias of the developer to an one direction is canceled.

[0006]

[Problem(s) to be Solved by the Invention] However, since it is restricted when the direction of the bias of a developer is always the same, that this approach is applied has the large place based on the property of equipment.

[0007] In view of the above-mentioned trouble, irrespective of the direction of a bias of a developer, this invention adjusts the amount of conveyances of a developer spontaneously, and makes it a technical problem to offer the developer which keeps the balance of the amount of a developer constant.

[0008]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention according to claim 1 The developer support which develops the latent image which conveyed the developer and was formed on latent-image support, Development container which holds the developer for supplying this developer support Developer feed zone material which agitates the toner and developer which are supplied and supplies the developer in

this development container to developer support, The developer specification-part material which sets the developer on this developer support as the thickness suitable for development, The member for developer flowing down which makes it flow down the developer scratched by this developer specification-part material to the part distant from this developer support, The member for skews for being in the middle of flowing down, and carrying out the skew of the developer to the direction which intersects perpendicularly with the shaft orientations of this developer support, In the developer equipped with the developer conveyance member which conveys this developer in this developer support revolving-shaft direction in response to a part of developer on this member for developer flowing down Before developer flows into this member for skews, according to the bias of the amount of a developer, it has the member which adjusts the amount in which a developer flows into this member for skews. It considers as a developer. Invention according to claim 2 is set to a developer according to claim 1. The above-mentioned members for skews are the shaft of the above-mentioned developer support, and a tabular member which has a revolving shaft perpendicularly. It considers as a developer. Invention according to claim 3 is set to a developer according to claim 1. The above-mentioned member for skews is a member of the shape of a rod which has a revolving shaft in the shaft and perpendicular direction of the above-mentioned developer support. It considers as a developer.

[0009] Moreover, the developer support which develops the latent image which invention according to claim 4 conveyed the developer, and was formed on latent-image support, Development container which holds the developer for supplying this developer support Developer feed zone material which agitates the toner and developer which are supplied and supplies the developer in this development container to developer support, The developer specification-part material which sets the developer on developer support as the thickness suitable for development, The member for developer flowing down which makes it flow down the developer scratched by this developer specification-part material to the part distant from this developer support, The member for skews for being in the middle of flowing down, and carrying out the skew of the developer to the direction which intersects perpendicularly with the shaft orientations of this developer support, In the developer equipped with the developer conveyance member which conveys this developer in this developer support revolving-shaft direction in response to a part of developer on this member for developer flowing down The developer which flowed into this member for skews considers as a developer equipped with the member which adjusts the amount of the developer which flows down according to the bias of the amount of a developer, before flowing down from this member for developer flowing down. Invention according to claim 5 is set to a developer according to claim 4. Said members for skews are the shaft of said developer support, and a tabular member which has a revolving shaft perpendicularly. It considers as a developer. Invention according to claim 6 is set to a developer according to claim 4. Said member for skews is a member of the shape of a rod which has a revolving shaft in the shaft and perpendicular direction of said developer support. It considers as a developer.

[0010]

[Embodiment of the Invention] Below, the operation gestalt of this invention is explained at a detail based on a drawing. Drawing 1 is the outline block diagram of the developer concerning this invention. The developer 2 consists of development container 2a and toner makeup section 2b. Among those, in development container 2a, as the developing roller 3 as developer support approaches the photo conductor drum 1 as latent-image support, it is arranged, and a development field is formed in both opposite part. The doctor blade 4 which regulates the amount of a developer is installed in the conveyance direction upstream of the developer of said development field. Furthermore, the churning roller 5 and the paddle wheel 6 are formed in the back field of the above-mentioned developing roller 3, and the developer by which churning mixing was carried out with the churning roller 5 is pumped up by the paddle wheel 6. And the developer case 21 as developer stowage material is arranged at the bottom so that a developing roller 3, a paddle wheel 6, and the churning roller 5 may be wrapped in. Moreover, toner makeup section 2b turns and lets out Toner T to the churning roller 5 by revolution of the toner makeup roller 22, when the toner concentration sensor 7 detects that the concentration of the toner supplied to the photo conductor drum 1 fell. And near the doctor blade 4 mentioned above, the separator 8 which located the extended direction end near the doctor blade 4, and located the extended direction other end on the churning roller 5 is arranged, respectively, and the pivotable conveyance screw 9 is arranged at the extended direction other end in this separator 8.

[0011] In development container 2a of such a configuration, a developer is pumped up, and it is emitted by the revolution of the paddle wheel 6 towards a developing roller 3, and is supported by the front face of a developing roller 3. And the developer which was supported by the developing roller 3 and moved with the revolution has thickness regulated by the doctor blade 4. Sequential conveyance of the developer of the surplus scratched with the doctor blade 4 is carried out with the fin 81 with which the plurality arranged on a separator 8 inclines at an image formation equipment back side.

[0012] Drawing 2 is the plan of a separator. In the maximum back end of a separator 8, a developer advice way is

arranged, and it shows around towards the conveyance screw 9 located in the extended direction other end, is reversely conveyed through the conveyance way 82 at the near side of image formation equipment with the above-mentioned on the conveyance screw 9, and falls through the churning roller 5 arranged at the forefront edge, and the slit 83 which counters. Before and after this, it is agitated so that toner concentration may become homogeneity in an image formation equipment cross direction by conveyance of each developer. Drawing 3 is the perspective view of a separator showing the first operation gestalt. The balancer 84 which can incline to this side where a developer flows into a fin 81 as above-mentioned. The means for solving a technical problem according to the bias of the amount of a developer is formed, and it is characterized by adjusting the amount in which a developer flows into a fin 81 and the conveyance screw 9. The configuration of a balancer 84 is set to tabular balancer 84a as shown in drawing 3 (b).

[0013] Next, it explains actuation of a balancer and a developer's flowing according to the bias of the amount of a developer. In drawing 3 (a), after the developer has inclined toward the F side, it inclines toward the F side, and according to this bias, a developer produces a bias also in the force of pushing a balancer 84, and the amount of the developer drawn on a separator 8 also inclines in the direction of alpha in this case. Since many amounts of the developer which flows a separator 8 top decrease in the F side by this at the R side, the relation between the amount MA of the developer conveyed with a fin 81 at the R side and the amount MB of the developer conveyed on the conveyance screw 9 at the F side serves as $MA > MB$, and the developer which inclined toward the F side is returned to the R side. On the contrary, when a developer inclines toward the R side, since the flow rate of the developer to an inclination and the conveyance screw 9 increases in the direction of beta and a balancer 84 serves as $MA < MB$, a developer will be returned to the F side and the balance of the amount of a developer is maintained.

[0014] Moreover, the configuration of a balancer 84 may be balancer 84b of the shape of a rod as shown in drawing 3 (c). By making the configuration of a balancer 84 cylindrical, the endurance over the pressure from a developer can be increased compared with tabular balancer 84b.

[0015] Drawing 4 is the plan of a separator showing the second operation gestalt. In this operation gestalt, it is characterized by forming a balancer 85 in the side down which a developer flows from a fin 81. Although actuation of the balancer 85 according to the amount of a developer is the same as that of the first operation gestalt, it performs accommodation of the amount of the developer in this side down which it flows from a separator 8 through a fin 81. The effectiveness acquired is the same as the first operation gestalt. Moreover, even if the configuration of a balancer 85 is tabular balancer 85a shown in drawing 4 (b), it may be balancer 85b of the shape of a rod shown in drawing 4 (c). The endurance over the pressure from a developer can be increased by making the configuration of a balancer into the shape of a rod.

[0016]

[Effect of the Invention] Since the amount of conveyances to developer support shaft orientations is adjusted by the balancer in case the developer which inclines and exists in developer support shaft orientations flows a separator top according to this invention, as explained above, the developer which can keep the balance of the amount of a developer constant can be offered.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the developer carried in image formation equipments, such as a copying machine which used the electrophotography method, facsimile, a printer, and a direct digital platemaking machine, and relates to amelioration of the agitator style to the developer support shaft orientations of a developer in detail.

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PRIOR ART

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[0003] So, in the conventional developer, in order to supply the developer of uniform toner concentration to developer support shaft orientations, shaft orientations [say / the so-called horizontal stirring] are stirred. More than one are arranged on the separator as a member for developer flowing down down which it is made to flow as a device of horizontal stirring of a developer in response to the developer scratched from developer support with the doctor blade as developer specification-part material. The fin as a member for skews to which the skew of the developer which flows this separator top is carried out to the direction which intersects perpendicularly with developer support shaft orientations, In response to a part of developer on this separator, with the direction conveyed with this fin, what has prepared the conveyance screw as a developer conveyance member conveyed to hard flow is used, and horizontal stirring of a developer is performed by this fin and the conveyance screw.

[0004] Moreover, what performs horizontal stirring as forms two or more steps of separators and differs the include angle which carries out a skew with a fin is proposed like the developer of the disclosure to JP,61-156075,A. However, in the developer which performs horizontal stirring with the above structures, if the horizontal of a developer shifts or the fluidity of a developer is changed by toner concentration, environmental change, etc., a developer will produce a bias in development support shaft orientations. The bias of such a developer will produce nonconformities, such as a gap of toner concentration control, and scattering of a toner, drop of a developer.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the amount of conveyances to developer support shaft orientations is adjusted by the balancer in case the developer which inclines and exists in developer support shaft orientations flows a separator top according to this invention, as explained above, the developer which can keep the balance of the amount of a developer constant can be offered.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, since it is restricted when the direction of the bias of a developer is always the same, that this approach is applied has the large place based on the property of equipment.

[0007] In view of the above-mentioned trouble, irrespective of the direction of a bias of a developer, this invention adjusts the amount of conveyances of a developer spontaneously, and makes it a technical problem to offer the developer which keeps the balance of the amount of a developer constant.

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention according to claim 1 The developer support which develops the latent image which conveyed the developer and was formed on latent-image support, Development container which holds the developer for supplying this developer support Developer feed zone material which agitates the toner and developer which are supplied and supplies the developer in this development container to developer support, The developer specification-part material which sets the developer on this developer support as the thickness suitable for development, The member for developer flowing down which makes it flow down the developer scratched by this developer specification-part material to the part distant from this developer support, The member for skews for being in the middle of flowing down, and carrying out the skew of the developer to the direction which intersects perpendicularly with the shaft orientations of this developer support, In the developer equipped with the developer conveyance member which conveys this developer in this developer support revolving-shaft direction in response to a part of developer on this member for developer flowing down Before developer flows into this member for skews, according to the bias of the amount of a developer, it has the member which adjusts the amount in which a developer flows into this member for skews. It considers as a developer. Invention according to claim 2 is set to a developer according to claim 1. The above-mentioned members for skews are the shaft of the above-mentioned developer support, and a tabular member which has a revolving shaft perpendicularly. It considers as a developer. Invention according to claim 3 is set to a developer according to claim 1. The above-mentioned member for skews is a member of the shape of a rod which has a revolving shaft in the shaft and perpendicular direction of the above-mentioned developer support. It considers as a developer.

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[0010]

[Embodiment of the Invention] Below, the operation gestalt of this invention is explained at a detail based on a drawing. Drawing 1 is the outline block diagram of the developer concerning this invention. The developer 2 consists of development container 2a and toner makeup section 2b. Among those, in development container 2a, as the developing roller 3 as developer support approaches the photo conductor drum 1 as latent-image support, it is arranged, and a development field is formed in both opposite part. The doctor blade 4 which regulates the amount of a developer is installed in the conveyance direction upstream of the developer of said development field. Furthermore, the churning

roller 5 and the paddle wheel 6 are formed in the back field of the above-mentioned developing roller 3, and the developer by which churning mixing was carried out with the churning roller 5 is pumped up by the paddle wheel 6. And the developer case 21 as developer stowage material is arranged at the bottom so that a developing roller 3, a paddle wheel 6, and the churning roller 5 may be wrapped in. Moreover, toner makeup section 2b turns and lets out Toner T to the churning roller 5 by revolution of the toner makeup roller 22, when the toner concentration sensor 7 detects that the concentration of the toner supplied to the photo conductor drum 1 fell. And near the doctor blade 4 mentioned above, the separator 8 which located the extended direction end near the doctor blade 4, and located the extended direction other end on the churning roller 5 is arranged, respectively, and the pivotable conveyance screw 9 is arranged at the extended direction other end in this separator 8.

[0011] In development container 2a of such a configuration, a developer is pumped up, and it is emitted by the revolution of the paddle wheel 6 towards a developing roller 3, and is supported by the front face of a developing roller 3. And the developer which was supported by the developing roller 3 and moved with the revolution has thickness regulated by the doctor blade 4. Sequential conveyance of the developer of the surplus scratched with the doctor blade 4 is carried out with the fin 81 with which the plurality arranged on a separator 8 inclines at an image formation equipment back side.

[0012] Drawing 2 is the plan of a separator. In the maximum back end of a separator 8, a developer advice way is arranged, and it shows around towards the conveyance screw 9 located in the extended direction other end, is reversely conveyed through the conveyance way 82 at the near side of image formation equipment with the above-mentioned on the conveyance screw 9, and falls through the churning roller 5 arranged at the forefront edge, and the slit 83 which counters. Before and after this, it is agitated so that toner concentration may become homogeneity in an image formation equipment cross direction by conveyance of each developer. Drawing 3 is the perspective view of a separator showing the first operation gestalt. The balancer 84 which can incline to this side where a developer flows into a fin 81 as above-mentioned The means for solving a technical problem according to the bias of the amount of a developer is formed, and it is characterized by adjusting the amount in which a developer flows into a fin 81 and the conveyance screw 9. The configuration of a balancer 84 is set to tabular balancer 84a as shown in drawing 3 (b).

[0013] Next, it explains actuation of a balancer and a developer's flowing according to the bias of the amount of a developer. In drawing 3 (a), after the developer has inclined toward the F side, it inclines toward the F side, and according to this bias, a developer produces a bias also in the force of pushing a balancer 84, and the amount of the developer drawn on a separator 8 also inclines in the direction of alpha in this case. Since many amounts of the developer which flows a separator 8 top decrease in the F side by this at the R side, the relation between the amount MA of the developer conveyed with a fin 81 at the R side and the amount MB of the developer conveyed on the conveyance screw 9 at the F side serves as $MA > MB$, and the developer which inclined toward the F side is returned to the R side. On the contrary, when a developer inclines toward the R side, since the flow rate of the developer to an inclination and the conveyance screw 9 increases in the direction of beta and a balancer 84 serves as $MA < MB$, a developer will be returned to the F side and the balance of the amount of a developer is maintained.

[0014] Moreover, the configuration of a balancer 84 may be balancer 84b of the shape of a rod as shown in drawing 3 (c). By making the configuration of a balancer 84 cylindrical, the endurance over the pressure from a developer can be increased compared with tabular balancer 84b.

[0015] Drawing 4 is the plan of a separator showing the second operation gestalt. In this operation gestalt, it is characterized by forming a balancer 85 in the side down which a developer flows from a fin 81. Although actuation of the balancer 85 according to the amount of a developer is the same as that of the first operation gestalt, it performs accommodation of the amount of the developer in this side down which it flows from a separator 8 through a fin 81. The effectiveness acquired is the same as the first operation gestalt. Moreover, even if the configuration of a balancer 85 is tabular balancer 85a shown in drawing 4 (b), it may be balancer 85b of the shape of a rod shown in drawing 4 (c). The endurance over the pressure from a developer can be increased by making the configuration of a balancer into the shape of a rod.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram of the developer concerning this invention.

[Drawing 2] It is the plan of a separator.

[Drawing 3] (a) is the perspective view of a separator showing the first operation gestalt, (b) is drawing showing the configuration of a tabular balancer, and (c) is drawing showing the configuration of a rod-like balancer.

[Drawing 4] It is the plan of a separator showing the second operation gestalt, and (b) is drawing showing the configuration of a tabular balancer, and (c) is drawing showing the configuration of a rod-like balancer.

[Description of Notations]

- 1 Photo Conductor Drum
- 2 Developer
- 2a Development container
- 2b Toner makeup section
- 21 Developer Case
- 22 Toner Makeup Roller
- 3 Developing Roller
- 4 Doctor Blade
- 5 Stirring Roller
- 6 Paddle Wheel
- 7 Toner Concentration Sensor
- 8 Separator
- 81 Fin
- 82 Conveyance Way
- 83 Slit
- 84 Balancer
- 84a Tabular balancer
- 84b Cylindrical balancer
- 85 Balancer
- 85a Tabular balancer
- 85b Cylindrical balancer
- 9 Conveyance Screw
- T Toner

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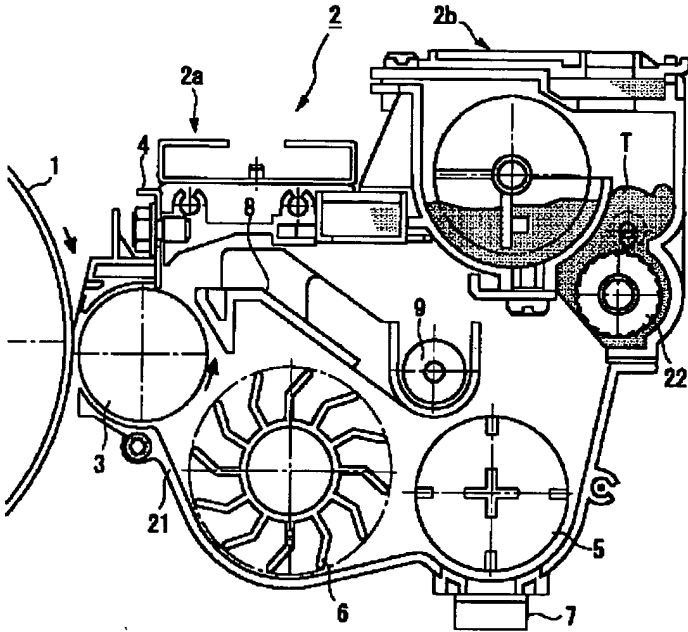
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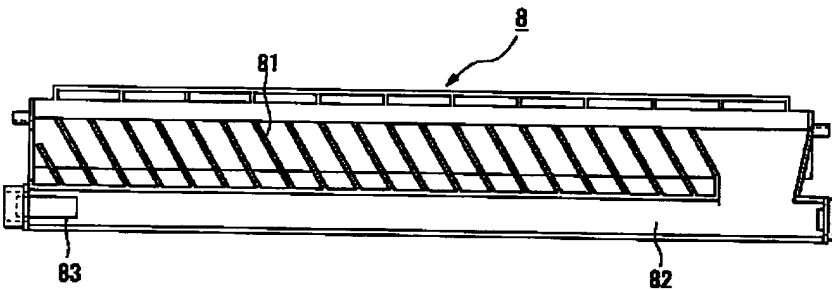
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DRAWINGS

[Drawing 1]

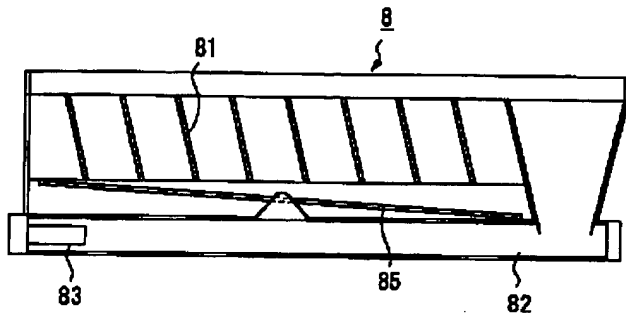


[Drawing 2]

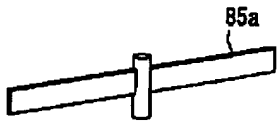


[Drawing 4]

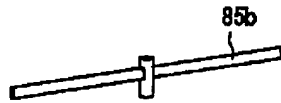
(a)



(b)

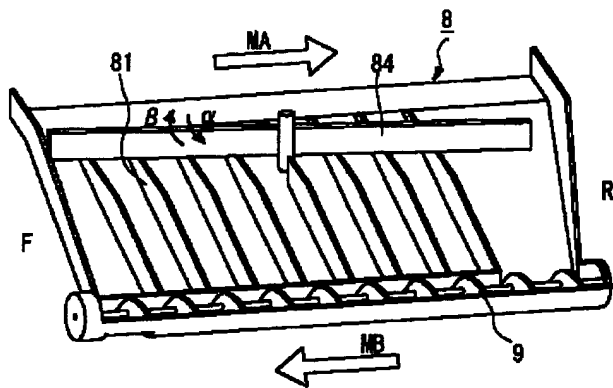


(c)



[Drawing 3]

(a)



(b)



(c)



[Translation done.]